

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellant: Tomohiro Oshiyama *et al.*) Group Art Unit: 1794
)
 Serial No.: 10/795,850) Confirmation No.: 1242
)
 Filed: March 8, 2004) Examiner: Thompson, Camie S.

For: **ORGANIC ELECTROLUMINESCENT ELEMENT AND DISPLAY EMPLOYING THE SAME**

VIA EFS WEB

Assistant Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Konica Minolta Holdings, Inc.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences known to Appellants, Appellants' legal representatives, or assignee that will directly affect, be directly affected by, or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF THE CLAIMS

Claims 1-7 and 9-12 are pending in the present Application.

Claims 1-7 and 9-12 stand finally rejected.

Claims 1-7 and 9-12, as they currently stand, are set forth in Appendix VIII.

Appellants hereby appeal the final rejection of Claims 1-7 and 9-12.

IV. STATUS OF THE AMENDMENTS

No amendments have been filed subsequent to the final rejection dated January 28, 2008. All prior amendments have been entered.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Organic electroluminescent elements are described. In a first embodiment recited in claim 1, an organic electroluminescent element comprises a light emission layer containing a host compound and a phosphorescent compound, the host compound having reorganization energy of from more than 0 to 0.50 eV, wherein the reorganization energy is energy in the process in which the host compound changes to the anion radical, and calculated employing Gaussian 98¹, wherein the host compound is represented by Formula 1 below,

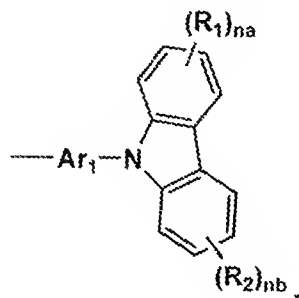
Formula 1:



¹ Specification-page 13, first full paragraph

wherein X_1 represents a chemical bond; n represents an integer of 2; and A_1 represents a group represented by the following Formula 2 below, provided that plural A_1 s may be the same or different;

Formula 2:



wherein Ar_1 represents a substituted phenylene group having a substituent in an ortho position relative to the chemical bond; and R_1 and R_2 independently represent a hydrogen atom or a substituent; and na and nb independently represent an integer of from 1 to 4². The host compound can have a phosphorescence wavelength of from 300 to 460 nm³ in some embodiments, and a phosphorescence wavelength of from 300 to 430 nm⁴ in other embodiments. The phosphorescent compound can be a metal complex containing a metal belonging to a group VIII of the periodic table as a center metal, e.g., an osmium complex, an iridium complex or a platinum complex⁵.

Claim 10 recites a second embodiment of an organic electroluminescent element that includes the same elements as the first embodiment with a few additional features. Notably, the host compound has a phosphorescence wavelength of from 300 to 460 nm and the phosphorescent compound has a phosphorescence wavelength of from 380 to 480 nm⁶ and is

² Specification, carryover paragraph on pages 14-15

³ Specification page 10, lines 14-16

⁴ Specification-page 10, lines 17-18

⁵ Specification-page 19, lines 11-17

⁶ Specification-page 10, lines 15-21

a metal complex containing a metal belonging to a group VIII of the periodic table as a center metal⁷.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-7 and 9-12 stand rejected under 35 U.S.C. § 103(a), as allegedly being unpatentable over U.S. Patent No. 6,902,830 A1 to Thompson *et al.*, (hereinafter “Thompson”).

VII. ARGUMENT

Claims 1-7 and 9-12 are not obvious over the cited art for the reasons provided below.

The Supreme Court addressed the issue of obviousness in *KSR International Co. v. Teleflex Inc.*, 127 S. Ct. 1727 (2007). The Court found that the factors set forth in *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1 (1966), still define the controlling inquiry as to whether claimed subject matter is obvious. *KSR*, 127 S. Ct. at 1734. The “Graham” factors are as follows: 1) “the scope and content of the prior art”; 2) the “differences between the prior art and the claims”; 3) “the level of ordinary skill in the pertinent art”; and 4) “[s]uch secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc.” *Id.* (quoting *Graham*, 383 U.S. at 17-18).

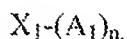
It has long been recognized that establishing a *prima facie* obviousness requires that all elements of the invention be disclosed in the prior art. *In re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970). In *KSR*, the Supreme Court also indicated that it remains legally insufficient to conclude that a claim is obvious “merely by demonstrating that each element was, independently, known in the prior art.” *KSR*, 127 S. Ct. at 1731. The Court further stated that it is important for the Examiner to “identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.” *Id.* at 1731. The Court also indicated that, “this analysis should be made explicit.” *Id.*

⁷ Specification-page 10, lines 18-21

1. Rejection of Claims 1-7 and 9-12

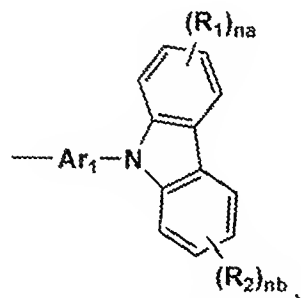
Independent Claims 1 and 10 generally pertain to organic electroluminescent elements comprising a light emission layer containing a host compound and a phosphorescent compound, the host compound having reorganization energy of from more than 0 to 0.50 eV, wherein the reorganization energy is energy in the process in which the host compound changes to the anion radical, and calculated employing Gaussian 98, wherein the host compound is represented by Formula 1 below,

Formula 1:



wherein X_1 represents a chemical bond; n represents an integer of 2; and A_1 represents a group represented by the following Formula 2 below, provided that plural A_1 s may be the same or different;

Formula 2:

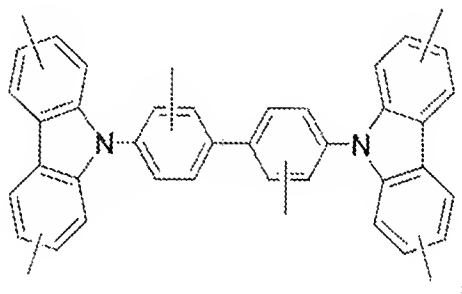


wherein Ar_1 represents a substituted phenylene group having a substituent in an ortho position relative to the chemical bond; and R_1 and R_2 independently represent a hydrogen atom or a substituent; and na and nb independently represent an integer of from 1 to 4.

Appellants assert that Thompson fails to teach or suggest the above claimed host compounds having a reorganization energy of from more than 0 to 0.50 eV in sufficient specificity that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.

Thompson is generally directed to organic light emitting devices comprised of emissive layers that contain an organometallic phosphorescent compound as a dopant. The emissive layers are formed with a host material, which are disclosed as substituted triaryl amines⁸. One example of the substituted tri-aryl amines included various carbazole compounds without any specific limitations as to substituent positions for any of the aromatic rings within the various structures.⁹ Thompson does not specifically teach any of the host compounds as claimed by Appellants or host materials that have the claimed reorganization energies. In fact, the Examiner has acknowledged that the reference relied on to make her rejection, i.e., the Thompson patent, does not disclose that the substituent on the phenylene group is substituted at the ortho position to the chemical bond.¹⁰ Moreover, Thompson is silent as to the reorganization energies for any of its host materials.

One of the carbazole based host materials disclosed by Thompson is represented by the following formula¹¹.



“wherein a line segment denotes possible substitution at any available carbon atoms or atoms of the indicated rings by alkyl or aryl groups.”¹² Based on this generic disclosure, the Examiner alleges that the Thompson reference suggests Applicants claimed species of host materials when R₁ and R₂ are alkyl and aryl, na and nb are both 1; and Ar₁ represents a phenylene group substituted with an alkyl or aryl group. Immediately following the

⁸ Thompson, Col. 7, lines 7-9

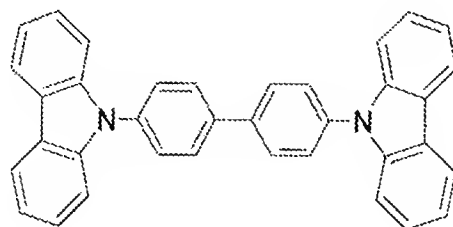
⁹ Thompson, Col. 7, lines 10-24; Col. 32, line 38 to Col. 33, line 45.

¹⁰ Office Action dated January 28, 2008, page 3

¹¹ Thompson, Col. 33, lines 20-33

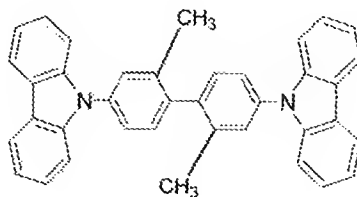
¹² Thompson, Col. 33, lines 30-33

disclosure of above formula, Thompson comments that “[a]n additional preferred molecule with a carbazole functionality is 4, 4’-N,N’ dicarbazole- biphenyl (which is commonly referred to as CBP). CBP has the following formula, which does not include any substitution for any of the aromatic rings present in the structure:



CBP is the only carbazole species disclosed by Thompson as a specific example of a suitable carbazole compound. Likewise, each example in Thompson that included a triarylamine host material used CBP. However, as is provided in Example 1 of Applicants’ specification, sample OLED No. 1-1, which used CBP as the host material, had a reorganization energy of 0.56 eV¹³ and falls outside the scope of Appellants’ claimed range of from more than 0 to 0.50 eV. Still further, in that same example, a direct comparison of Appellants’ host material in accordance with the claimed invention (OLED No. 1-2: TCBP1, the structure of which is shown below) was made against CBP. The results clearly showed an unexpected and significant difference in terms of reorganization energy, emission luminance, and lifetime.

TCBP1

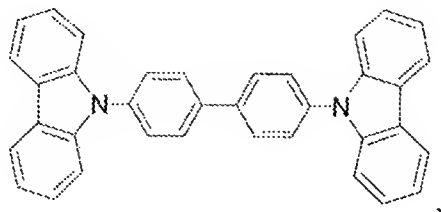
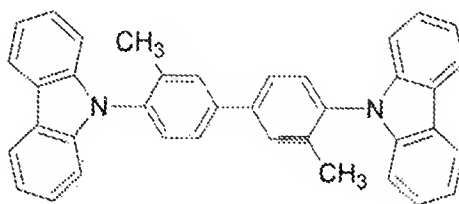
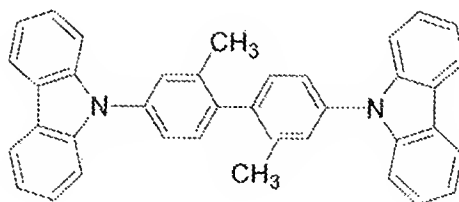


¹³ Specification, page 52, Table 1

One of skill in the art would not arrive at Appellant's claimed invention when considering Thompson as a whole. Thompson provides no regard for reorganization energies since there is no mention of this feature and many of the possible carbazole compounds defined by Thompson would likely not fall within Appellants' claimed range. Likewise, one of skill in the art would have no appreciation of the unexpected benefits that result when the Ar₁ represents a substituted phenylene group having a substituent in an ortho position relative to the chemical bond, e.g., relatively high emission luminance and extended lifetimes. The fact that a claimed species or subgenus is encompassed by a prior art genus is not sufficient by itself to establish a *prima facie* case of obviousness. *In re Baird*, 16 F.3d 380, 382, 29 USPQ2d 1550, 1552 (Fed. Cir. 1994) ("The fact that a claimed compound may be encompassed by a disclosed generic formula does not by itself render that compound obvious."); *In re Jones*, 958 F.2d 347, 350, 21 USPQ2d 1941, 1943 (Fed. Cir. 1992) (Federal Circuit has "decline[d] to extract from *Merck [& Co. v. Biocraft Laboratories Inc.*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir. 1989)] the rule that ... regardless of how broad, a disclosure of a chemical genus renders obvious any species that happens to fall within it."). See also *In re Deuel*, 51 F.3d 1552, 1559, 34 USPQ2d 1210, 1215 (Fed. Cir. 1995).

It is also well settled law that the presumption of obviousness based on a reference disclosing structurally similar compounds may be overcome where there is evidence showing there is not reasonable expectation of similar properties in structurally similar compounds. *In re May*, 574 F.2d 1082, 197 USPQ 601 (CCPA 1978). During prosecution, Appellants provided a Declaration submitted under 37 CFR 1.132, a copy of which is attached and noted in Evidence Appendix IX. In the Declaration, comparative tests were carried out employing, as a comparative compound, Thompson's preferred host material CBP or compound C in which the substituent on the phenylene group is located at the meta position to the chemical bond in the instant formula 1. Compound C is closer in chemical structure to the claimed inventions than CBP and thereof is considered the closest prior art. The comparative compounds were compared to TCBP1 compound, which is commensurate in scope with the

claims and includes substitution at the ortho position to the chemical bond. The structures of each compound are provided below:

CBP**Compound C****TCBP1**

The results provided in the Declaration are reproduced below.

| Sample OLED No. | Compound used in light emission layer | Reorganization energy (eV) | Emission luminance (%) | Emission lifetime (%) | Remarks |
|-----------------|---------------------------------------|----------------------------|------------------------|-----------------------|-------------|
| C-1 | CBP | 0.56 | 100 | 100 | comparative |
| C-2 | Compound C | 0.58 | 115 | 103 | comparative |
| I-1 | TCBP1 | 0.41 | 165 | 135 | invention |

As is apparent, Compound C (Ar₁ substitution at the meta positions), which has a reorganization energy of 0.58, falls outside the claimed host compound. Likewise, CBP falls outside the scope of the claimed reorganization energies. In contrast, the inventive organic EL element sample OLED I-1 containing TCBP1 (Ar₁ substitution at the ortho positions) provided significantly higher emission luminance and longer lifetime as compared with comparative organic EL element employing CBP, which was disclosed in Thompson as being the preferred host material, or comparative organic element employing compound C, which is structurally closer to the invention than CBP. These results are unexpected to one of ordinary skill in the art and demonstrate the unpredictability associated within the genus disclosed by Thompson, a genus that could potentially include thousands upon thousands of compounds. As such, it would not have been obvious to one of ordinary skill in the relevant art to make the claimed invention as a whole, i.e., to select the claimed species or subgenus from the disclosed prior art genus.

An applicant can rebut a prima facie case of obviousness by presenting comparative test data showing that the claimed invention possesses unexpectedly improved properties or properties that the prior art does not have. *In re Dillon*, 919 F.2d 688, 692-93, 16 U.S.P.Q.2d 1987, 1901 (Fed. Cir. 1990). As discussed in the Declaration and in the arguments herein, the claimed reorganization energy and ortho substitution as claimed provided unexpectedly high

emission luminance and long lifetime relative to similar compounds that do not have ortho substitution. Moreover, many of the compounds within the genus disclosed by Thompson will likely not have a reorganization energy of from more than 0 to 0.50 eV.

Furthermore, as enunciated in *In re Dillon*, the Office is expected to consider any teaching or suggestion in the reference of a preferred species or subspecies that is significantly different in structure from the claimed species. As noted above, Thompson explicitly refers to CBP as the preferred species and uses this particular carbazole in its examples. CBP lacks any substitution on the aromatic rings. As demonstrated in the Declaration, the Ar₁ substitution at the ortho positions provided unexpected properties not provided by CBP and possessed a reorganization energy of from more than 0 to 0.50eV. MPEP §2144.08 is clear that such a teaching may weigh against selecting the claimed species or subgenus and thus against a determination of obviousness. See also *Baird* F3.d at 382-383, 29 USPQ2d at 1552 (reversing obviousness rejection of species in view of large size of genus and disclosed optimum species which differed greatly from and were more complex than the claimed species); and *Jones*, 958 F2d at 350, 221 USPQ2d at 1943 (reversing obviousness rejection over novel dicamba salt with acyclic structure over broad prior art genus encompassing claimed salt, wherein disclosed examples of genus were dissimilar in structure, lacking an ether linkage or being cyclic). MPEP 2144.08 goes on further to state that “teachings of preferred species (i.e., CBP) of a complex nature within a disclosed genus may not motivate an artisan of ordinary skill to make similar complex species and thus teach away from making simple species within the genus (i.e., ortho substituted compounds). Given the size of the genus disclosed by Thompson and that the preferred species (i.e., CBP) disclosed by Thompson, one of ordinary skill in the art would not have a reasonable expectation success in elucidating the Appellants claimed species and invention.

To arrive at the subject matter of Claim 1 or 10 from the disclosure of Thompson, the ordinarily skilled person in the art would have to make a number of selections among thousands of technical possibilities disclosed in Thompson. There is no specific incentive in Thompson for selecting Appellants’ host material from these technical possibilities,

particularly the claimed host compound as represented by formula 1, which is extremely narrowly limited, in order to provide the advantageous results of the claimed invention such as the excellent emission luminance and long lifetime. Therefore, the claimed cannot be considered as obvious over Thompson.

In view of the foregoing, Appellants respectfully request removal of the 35 U.S.C. §103 rejection against independent Claims 1 and 10 and of Claims 2-7 and 9-12, which depend therefrom.

If there are any additional charges with respect to this Appeal Brief, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

CANTOR COLBURN LLP

Date: March 28, 2008
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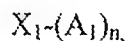
By: /Peter R. Hagerty/
Peter R. Hagerty
Registration No. 42,618

VIII. CLAIMS APPENDIX

IN THE CLAIMS

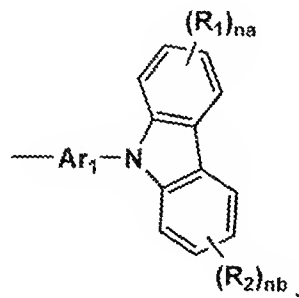
1. (Rejected) An organic electroluminescent element comprising a light emission layer containing a host compound and a phosphorescent compound, the host compound having reorganization energy of from more than 0 to 0.50 eV, wherein the reorganization energy is energy in the process in which the host compound changes to the anion radical, and calculated employing Gaussian 98, wherein the host compound is represented by Formula 1 below,

Formula 1:



wherein X_1 represents a chemical bond; n represents an integer of 2; and A_1 represents a group represented by the following Formula 2 below, provided that plural A_1 s may be the same or different;

Formula 2:



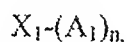
wherein Ar_1 represents a substituted phenylene group having a substituent in an ortho position relative to the chemical bond; and R_1 and R_2 independently represent a hydrogen atom or a substituent; and na and nb independently represent an integer of from 1 to 4.

2. (Rejected) The organic electroluminescent element of claim 1, wherein the host compound has a phosphorescence wavelength of from 300 to 460 nm.

3. (Rejected) The organic electroluminescent element of claim 1, wherein the host compound has a phosphorescence wavelength of from 300 to 430 nm.
4. (Rejected) The organic electroluminescent element of claim 3, wherein the phosphorescent compound has a phosphorescence wavelength of from 380 to 480 nm.
5. (Rejected) The organic electroluminescent element of claim 4, wherein the phosphorescent compound is a metal complex containing a metal belonging to a group VIII of the periodic table as a center metal.
6. (Rejected) The organic electroluminescent element of claim 5, wherein the phosphorescent compound is an osmium complex, an iridium complex or a platinum complex.
7. (Rejected) The organic electroluminescent element of claim 6, wherein the phosphorescent compound is an iridium complex.
8. (Canceled)
9. (Rejected) A display comprising the organic electroluminescent element of claim 1.

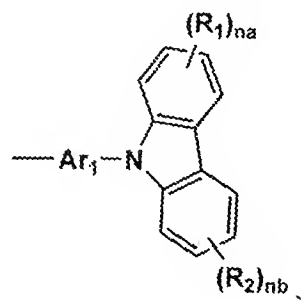
10. (Rejected) An organic electroluminescent element comprising a light emission layer containing a host compound having reorganization energy of from more than 0 to 0.50 eV and a phosphorescence wavelength of from 300 to 460 nm and a phosphorescent compound having a phosphorescence wavelength of from 380 to 480 nm, the phosphorescent compound being a metal complex containing a metal belonging to a group VIII of the periodic table as a center metal, wherein the reorganization energy is energy in the process in which the host compound changes to the anion radical and calculated employing Gaussian 98, wherein the host compound is represented by Formula 1 below,

Formula 1:



wherein X_1 represents a chemical bond; n represents an integer of 2; and A_1 represents a group represented by the following Formula 2 below, provided that plural A_1 s may be the same or different;

Formula 2:



wherein Ar_1 represents a substituted phenylene group having a substituent in an ortho position relative to the chemical bond; and R_1 and R_2 independently represent a hydrogen atom or a substituent; and na and nb independently represent an integer of from 1 to 4.

11. (Rejected) The organic electroluminescent element of Claim 1, wherein the substituents of R1 and R2 and the substituents in the ortho position relative to the chemical bond independently represent an alkyl group, a cycloalkyl group, an aryl group, a halogen atom, an alkenyl group, and alkoxycarbonyl group, an alkoxy group, an aryloxy group, a dialkylamino group, a cyano group, a hydroxyl group, a styryl group, or an aralkyl group.

12. (Rejected) The organic electroluminescent element of Claim 10, wherein the substituents of R1 and R2 and the substituents in the ortho position relative to the chemical bond independently represent an alkyl group, a cycloalkyl group, an aryl group, a halogen atom, an alkenyl group, and alkoxycarbonyl group, an alkoxy group, an aryloxy group, a dialkylamino group, a cyano group, a hydroxyl group, a styryl group, or an aralkyl group

IX. EVIDENCE APPENDIX

Evidence submitted pursuant to 37 C.F.R. §1.132 entered by the Examiner in a response to an Office Action dated August 14, 2007 is relied upon by the Appellant in this appeal, a copy of which is attached hereto.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

U.S. Patent

Application of: T. Oshiyama et al.

Serial Number : 10/795,850

Filed : March 08, 2004

For : ORGANIC ELECTROLUMINESCENT ELEMENT AND
DISPLAY EMPLOYING THE SAME

Group Art Unit: 1774

Examiner : Camie S. Thompson

DECLARATION UNDER 37 C.F.R. 1.132

Assistant Commissioner For Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Tomohiro Oshiyama, hereby declare and say as follows:

That I am a post graduate from Tsukuba University having been awarded a Masters Degree in Science and engineering in March 1993.

That since April 1993, I have been employed by Konica Corporation (present Konica Minolta Holdings Inc.), the owner of the above-identified application. During my employment, I have been engaged in the research and the study of organic electroluminescent elements in the Research and Development Laboratory of my company.

That I am a co-inventor of the present application.

That I am familiar with the subject matter of the present invention.

What follows is an accurate summary of experiments conducted according to my detailed instructions and under my personal supervision, and the results obtained therefrom.

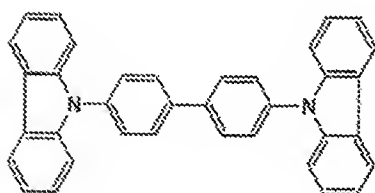
Comparative tests

1. Claims 1-7 and 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thompson et al., U.S. Patent Number 6,902,830. The Examiner states on page 3, text lines 4-10 of the outstanding Office Action, "Thompson does not specifically disclose that the substituent on the phenylene group is substituted at the ortho-position to the chemical bond. Thomson does disclose possible substitution at any available carbon atom by alkyl or aryl groups. Substitution position on the compound affects HOMO and LUMO energies. Therefore, it would have been obvious to one of ordinary skill in the art to have the substituent at the ortho position in order to control current-voltage characteristics and the lifetime of the device. I disagree with this.

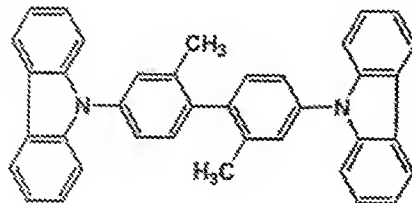
As the Examiner notes, Thompson does not specifically disclose that the substituent on the phenylene group is substituted at the ortho-position to the chemical bond. Thompson does not disclose that the substituent on the phenylene group at the ortho-position to the chemical bond is preferred. Rather, Thompson clearly teaches and suggests CBP as the preferred host material (Columns 32-33). Further, Thompson does not disclose the advantageous results of the invention that provide excellent emission luminance and long life-time.

2. In order to show the unexpected results of the invention, comparative tests were carried out employing, as a comparative compound, Thompson's preferred host material CBP (as shown below), or Compound C (as shown below) in which the substituent on the phenylene group is located at the meta-position to the chemical bond in instant formula 1. Herein, Compound C is closer in chemical structure to the invention than CBP and therefore, is considered to be closest prior art. Thus, organic EL element sample OLED C-1 was prepared in the same manner as organic EL element sample OLED 1-1 in Example 1 of the present Specification. Sample OLED C-1 comprised CBP as the host material. Organic EL element sample OLED C-2 was prepared in the same manner as organic EL element sample OLED C-1 above, except that Compound C was used instead of CBP. Organic EL element sample OLED I-1 was prepared in the same manner as an organic EL element sample OLED 1-2 in Example 1 of the present Specification. Sample OLED I-1 comprised TCBP1 (as shown below) as the host material.

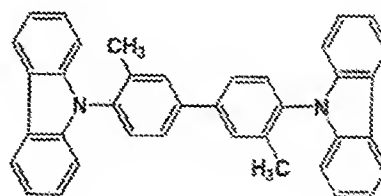
CBP



TCBP1



Compound C



The resulting samples were evaluated for emission luminance and emission lifetime in the same manner as in Example 1 of the present Specification. The results are shown in Table 4.

Table 4

| Sample OLED No. | Compound used in light emission layer | Reorganization energy (eV) | Emission luminance (%) | Emission lifetime (%) | Remarks |
|-----------------|---------------------------------------|----------------------------|------------------------|-----------------------|---------|
| C-1 | CBP | 0.56 | 100 | 100 | Comp. |
| C-2 | Compound C | 0.58 | 115 | 103 | Comp. |
| I-1 | TCEP1 | 0.41 | 165 | 135 | Inv. |

Comp.: Comparative, Inv.: Inventive

As is apparent from Table 4, Compound C, which has reorganization energy of 0.58, falls outside the claimed host compound, and inventive organic EL element sample OLED I-1 provides high emission luminance and long lifetime as compared with comparative organic EL element sample OLED C-1 employing CBP, which is disclosed in Thompson as the preferred host material, or comparative organic EL element sample OLED C-2 employing Compound C which is closer to the invention than CBP and therefore, is considered to be closest prior art. These results are unexpected to one of ordinary skill in the art. Therefore, it would not have been obvious to one of ordinary skill in the art to attain the subject matter of Claims 1, 9 and 10 over Thomson. In view of the above, I believe that claims 1, 9 and 10, and all the claims, which depend therefrom, will be in a situation of allowance.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001, of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Dated: September 21, 2007

Tomohiro Oshiyama

TOMOCHIRO OSHIYAMA

X. RELATED PROCEEDING APPENDIX

There are no other related appeals or interferences known to Appellants, Appellants' legal representatives, or assignee that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.